ABSTRACT

Title of dissertation: PROACTIVE AD HOC DEVICES FOR RELAYING REAL-TIME VIDEO PACKETS

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Being a set of mobile computing devices connected over wireless links, an ad hoc wireless network is characterized by dynamic changes that affect the communication. Real-time video communication over wireless multi-hop ad hoc networks remains challenging, as video traffic is bursty and highly time-sensitive while network resources are limited and time-varying. This dissertation introduces a novel architecture for intermediate ad hoc nodes in which they are not just passive forwarders, but are aware of video packet semantics and hence actively get involved in the communication. Each node is proposed to reserve a small memory space for transiently caching video packets, so that it can responsively process ARQ requests on behalf of the sender. This will obviously shorten the length of retransmission round, and therefore enhance communication reliability and reduce power consumption as a whole.

As retaining packets, the node is also able to select the most appropriate packets to relay first when channel conditions are unfavorable, aiming at minimizing the playback distortion. In particular, we propose a novel discarding mechanism in which useless packets can be detected and destroyed to save energy and bandwidth. Both theoretical analysis and experimental results collected from a real-life testbed of heterogeneous platforms support our proposed framework, with respect to feasibility and efficiency.